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14. ABSTRACT

The primary purpose of this project was to establish a state-of-the-art computer networking laboratory to support the department curriculum in the areas of data communications, computer networks, and Internet/Intranet programming through hands-on approaches. As stated in the project proposal, the laboratory would provide the necessary technological infrastructure for the department

- To improve the quality of education in the existing courses related to computer networks and data communications as well as other computer science courses such programming languages and computer hardware and software systems.
- To design and implement an advanced level computer science course in computer networks and data communications.
- To provide faculty the technological tools to conduct research programs.

The construction of the lab initiated in August 1, 1999 and continued until September 15, 2000. The lab was constructed in three phases, namely, planning and design, purchasing and installation, and testing. Each phase was successfully carried out to completion by the project's Principal and Co-Principal investigators and valuable contributions from the department and the university administrators and staff.

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Final Technical Report

for
Computer Networking Laboratory for Undergraduate Computer Technology Program
Contract number F49620-99-1-0304

Department of Mathematics and Computer Science
Fort Valley State University
Fort Valley, GA 31095

Prepared by:
Masoud Naghedolfeizi, Principal Investigator

October 30, 2000

Project Summary

The primary purpose of this project was to establish a state-of-the-art computer networking laboratory to support the department curriculum in the areas of data communications, computer networks, and Internet/Intranet programming through hands-on approaches. As stated in the project proposal, the laboratory would provide the necessary technological infrastructure for the department

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The construction of the lab initiated in August 1, 1999 and continued until September 15, 2000. The lab was constructed in three phases, namely, planning and design, purchasing and installation, and testing. Each phase was successfully carried out to completion by the project's Principal and Co-Principal investigators and valuable contributions from the department and the university administrators and staff.

The total grant awarded by DOD to the project was int the amount of $136,600. The grant funds were used to purchase equipment computers, networking devices, and software systems. In addition to the grant money, Fort Valley State University (FVSU) contributed approximately $5,000 to the project to build a wiring system in the lab so that lab could operate as a stand-alone networking laboratory. The university also provided financial support for the principal investigator to attend a training course in the area of computer networks.

Project Approach

The construction of the computer networking laboratory was accomplished in three phases. In the first phase, planning and analysis, decisions were made in regard to the lab physical layout, wiring system, computer platforms, and networking equipment. The physical layout of the lab included three long rows at the left and four short rows at the right of the lab, with sufficient space between rows to support physically challenged users. The left and right rows each could accommodate six and two computers, respectively. Figures 1.a-1.c show the lab with the installed computers on each row.

A wiring system was also designed to network computers in the lab so that there would be no need to use the campus network. The lab design required to install wall-mounted outlets with six and two RJ-45 connectors for each left and right row, respectively. We also designed the wiring closet and its location in the lab. The closet could hold up to 10 stackable networking devices. It also contains cable management, ten power-outlets with surge protection, and a security lock (Figure 2).
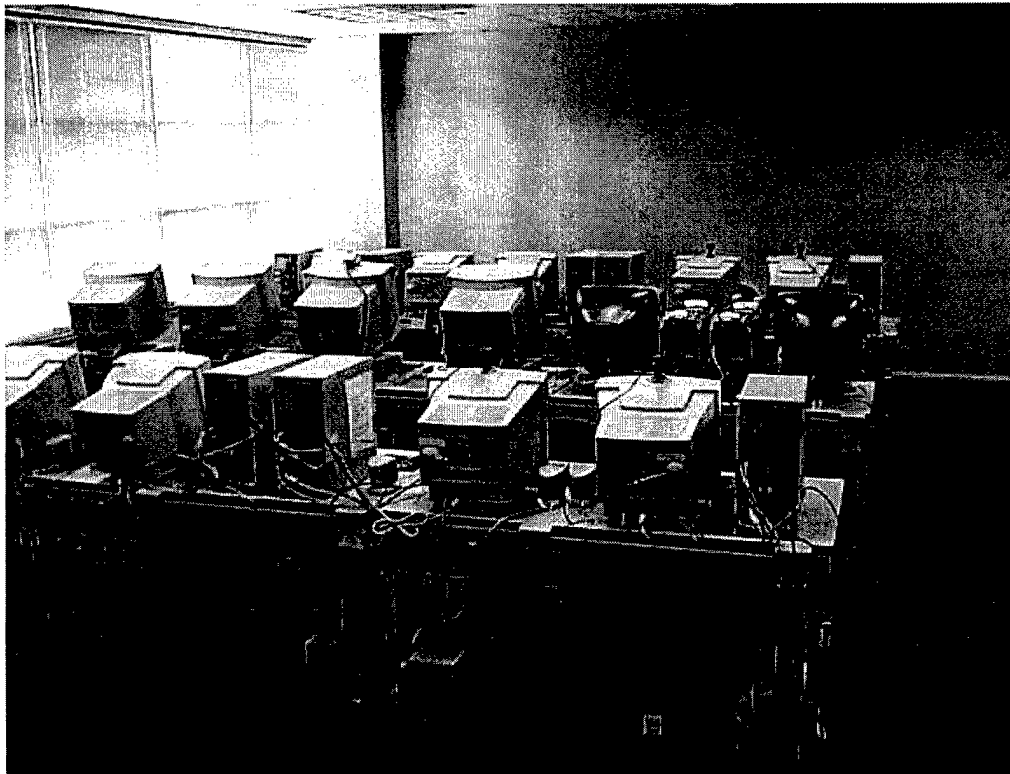
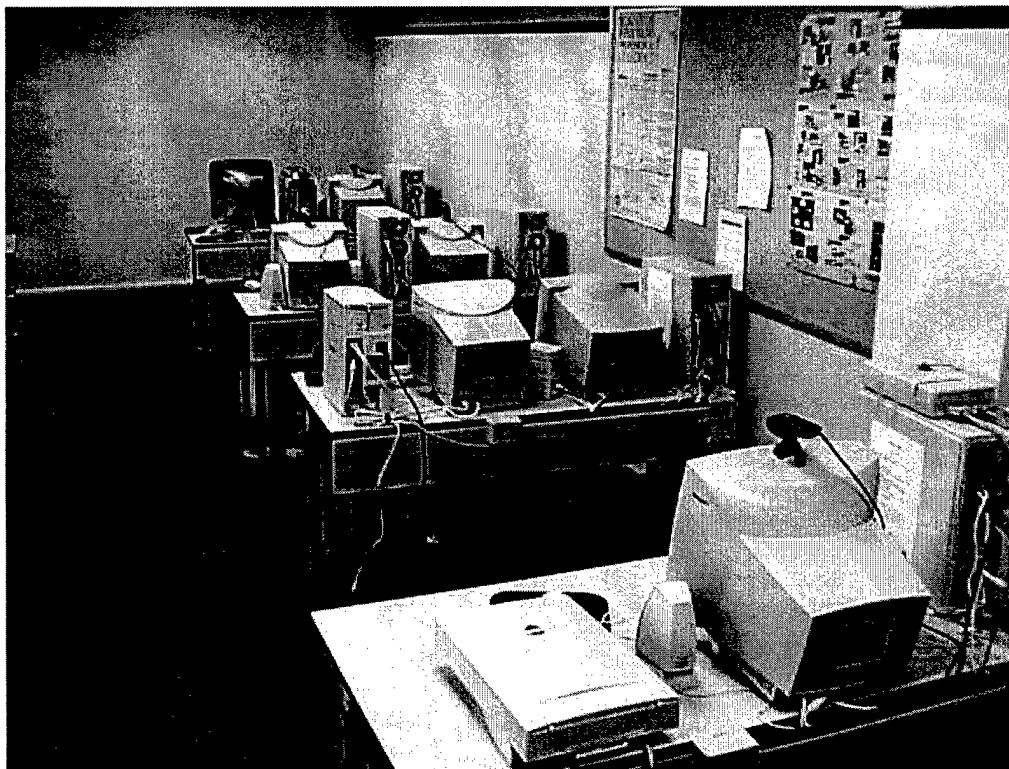Figure 1.a: Computer Lab Network lab in Room 319 of CTM Building (Left Rows)

Figure 1.b: Computer Network Lab in Room 319 of CTM Building (Right Rows)

One of the main considerations given during the planning phase was to include diversity both in hardware and software systems used in the lab. The diversity would allow us to build models of corporate and enterprise networks, and to simulate many real world scenarios that may occur in large networks. To include this diversity, three different computer platforms and servers, currently used extensively in real world networks, were selected. These were IBM compatible PCs, Sun machines, Apple Macintoshes, and NT and Novell-NetWare servers.

We initially planned the network lab to include ten IBM PCs, three Macintosh machines, four Sun workstations, one NT server, one Novell-NetWare server, and one Sun server. However, this setting was later modified by increasing the number of PCs to fifteen (five with NT workstation and ten with Windows 98 operating systems) and Sun workstations to fourteen (five Solaris 7 and nine with Solaris 8). The falling prices in computer industry, placing responsible and cost-effective purchase orders, large educational discounts, and special offers by computer manufacturers such as Sun Microsystems made it possible to expand the scope of the initial design plan.

To design, implement, and deploy various networking configurations and architectures, it was also necessary to select a wide array of networking devices. These devices included active hubs, manageable hubs, fast Ethernet and token ring switches, routers, wireless network interface cards and access boxes, connectors, cables, and wiring tools for instructional purposes. The networking devices were selected from different manufacturers and vendors to examine compatibility and performance issues in a diverse computer network. To select some of these devices such as the type of routers and token ring switch, we extensively consulted with the project consultant as well as experts from both industry and academia.

The initial phase of planning and design was completed during the first quarter of the project. However, various modification and extension were made to the initial design during the course of project.

Purchasing and Installation Phase

In this phase, we first studied various vendors and manufacturers of computers and networking equipment to identify manufacturers with the best quality products. For PC computer, three manufacturers were selected; namely, Compaq, Dell, and Gateway 2000. After reviewing their Web pages, we concluded that the Dell Company was the best choice for purchasing PC computers and NT and Novell servers. The equipment reliability and competitive prices as well as long-term on-site warranty were major factors in selecting the Dell Company for purchasing PC computers and the servers. Sun Microsystems and Apple companies were chosen for purchasing Sun machines and Apple computers. All the selected computers featured multi-media capabilities. Table 1 shows the list of technical features for the selected computers.

Table1: Technical Features of Computers in the Computer Network Lab.

Computer Type	MHz	Hard Drive	Memory	CD ROM	CD ROM RW	DVD	Floppy Drive	Tape Drive	Zip Drive
Dell Opti-Plex GX1p	600	20GB	128MB	No	No	Yes	Yes	No	Yes
Dell Opti-Plex GX1p	600	20GB	128MB	No	Yes	No	Yes	No	Yes
Dell Opti-Plex GX1p	600	20GB	128MB	Yes	No	No	Yes	No	Yes
Dell Opti-Plex GX1p	600	20GB	128MB	Yes	No	No	Yes	No	Yes
Dell Opti-Plex GX1p	600	20GB	128MB	Yes	No	No	Yes	Yes	No
Apple Mcintosh	450	12GB	192MB	Yes	No	No	No	No	Yes
Apple Mcintosh	450	12GB	192MB	Yes	No	No	No	No	Yes
Sun Microsystems Ultra 5	333	9.1GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystems Ultra 5	333	9.1GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystems Ultra 5	333	9.1GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystems Ultra 5	333	9.1GB	128MB	Yes	No	No	Yes	No	No
Dell Opti-Plex GX1p	600	19GB	128MB	No	Yes	No	Yes	No	Yes
Dell Opti-Plex GX1p	600	19GB	128MB	No	Yes	No	Yes	No	Yes
Dell Opti-Plex GX1p	600	19GB	128MB	No	Yes	No	Yes	No	Yes
Dell Opti-Plex GX1p	600	19GB	128MB	No	Yes	No	Yes	No	Yes
Dell Opti-Plex GX1p	600	19GB	128MB	No	No	Yes	Yes	No	Yes
Dell PowerEdge Server 2300	600	18GB	512MB	Yes	No	No	Yes	Yes	No
Dell Dimension XPS T650r	600	9.1GB	128MB	Yes	No	No	Yes	No	Yes
Dell Dimension XPS T650r	600	9.1GB	128MB	Yes	No	No	Yes	No	Yes
Dell Dimension XPS T650r	600	9.1GB	128MB	Yes	No	No	Yes	No	Yes
Dell PowerEdge Server 4400	600	9.1GB	512MB	Yes	No	No	Yes	Yes	No
Sun Microsystem Ultra 10	440	9GB	256MB	Yes	No	No	Yes	Yes	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Sun Microsystem Ultra 5	360	8GB	128MB	Yes	No	No	Yes	No	No
Apple Mcintosh	500	20GB	256MB	Yes	No	No	No	No	Yes
Dell Dimension L550r	500	4.3GB	64MB	Yes	No	No	Yes	No	Yes
Dell Dimension L550r	500	4.3GB	64MB	Yes	No	No	Yes	No	Yes
Dell Inspiron 3800 Notebook	500	6GB	128MB	Yes	No	No	Yes	No	No

The networking devices were purchased from three manufacturers; namely, 3COM, CISCO, and Netgear. The devices from these manufactures are known to be highly reliable with little or no maintenance costs. These manufacturers also offered educational discounts up to 30% and a minimum of one-year warranty for many networking devices that we purchased.

During the installation phase, we first prepared Room 319 in Computer Technology and Mathematics (CTM) building according to our design layout. This required to adding more desks and seats to accommodate both computers and users. As we received the computers and networking equipment, we installed and configured them based on our design plan. It should be mentioned that it normally took between one and half and two months to receive the requested item after placing each purchase-order. For orders over $2,500, the University System of Georgia required a biding process. This even further delayed the arrival of items over $2,500 (sometimes as many as three months). For these reasons, the installation phase was an ongoing effort throughout the entire project. In installing and configuring some networking devices, we often needed to consult with the equipment manufacturers or vendors.

This phase began in September 1999 and continued till September 1, 2000.

Testing Phase

In this phase, we tested all the computers and networking equipment in various computer network topologies. During this phase, we realized that the manufacturer's configurations for certain equipment had to be modified to fit our project. For instance, the NT server was initially configured by the vendor to operate as a stand-alone server. This configuration was not suitable for the lab; and thus, we reinstalled the Microsoft NT server 4 on the machine so that it could operate as a Primary Domain Controller server.

Networking protocols such as TCP/IP, NetBEUI, and IPX/SPX were first loaded into the computers and then configured and tested for different networking topologies and designs. Various diagnostics and testing procedures were used to test the functionality of the network lab. The servers were tested for client-server architecture and file and print sharing capabilities. The computers in the lab were also networked to a HP laser jet printer located in the lab. The Sun computers were also networked among themselves so that a user can log to his/her account from any Sun machine in the lab.

Networking Capabilities

The computer networking lab can currently support the following networking designs and configurations:
- Peer-to-Peer networking using Microsoft Windows 95/98 and/or NT
- Client-server architecture
- Token ring topology
- Ethernet using TCP/IP

- Wireless network using TCP/IP protocol or NetBEUI
- Hybrid Topologies including Token ring with Ethernet or Wireless with Ethernet.
- Networking design models such as one, two, and three-layer network models.
- Networks with multi-platform computers such PCs, Apples, and Suns
- FTP, Web, DNS, DHCP, and WINS servers
- Voice and Video over IP
- Network performance measurement using Obsever 6 software.
- Network monitoring using Monitor Agent, SNMP and Observer 6.
- LAN to WAN interface via an ISDN line
- Data communications over telephone and ISDN lines.
- Network tuning using managed hubs, Ethernet switches, and servers.

The lab is presently equipped with the necessary technological tools to conduct research projects in the areas of computer networks and communications.

Project Impact

Since its inception, the computer network lab has had a direct impact on the quality of the courses we offer in the areas of data communications and computer networks. As a result of this lab, the department was able to offer the first course in data communications and networks (CSCI 3150) in the Spring semester 1999 (nearly after three years). For the first time in the history of our department, this course was offered with a laboratory support. This caused a record number of twenty-two (22) students to register for the course. The students' support for the course indicated that they were well aware of the important role that computer network and data communication systems play in today's high-tech industries as well as their own future careers. In fact, many students took the course in addition to the departmental course requirement for graduation in their respective majors. The class also attracted three students from Electrical Engineering Technology major. It should be noted that during the time that the course was offered the lab was partially operational; however, students still learned to setup, configure, and design peer-to-peer and Ethernet computer networks as well as print and file sharing methods. In addition, they researched the performance of networking equipment such as hub and Ethernet switches by transferring large file sizes from one computer to other computers. They were also able to configure and test TCP/IP protocol for both PCs and Sun workstations and transmit video and voice over IP using Microsoft net-meeting software.

The construction of the lab also encouraged us to expand our curriculum in this area by designing an advanced course in data communications and networks. This task was accomplished by principal and co-principal investigators of this project with consultation with experts from both academia and industry. The course proposal was submitted to curriculum committees in the department, college of arts and sciences, and university for its approval in February 2000. The committees approved the course proposal and subsequently the course was added to the 2001-2003 University's Catalog. The course is currently being offered as an elective course for Computer Science, Computer Information Systems, and Electrical Engineering Technology majors. Presently, four students, all computer science

for the course. Copies of the course proposal and the course description in the new catalog are shown in Appendix A.

It is worth noting that as a result of this improvement in our computer networking curriculum, one of our graduating students (Mr. Don Harris) is now determined to purse graduate studies in the area of computer networks and data communications at the Georgia Institute of Technology. He has already processed his application and is now waiting for his application response. Also, two other students received job offers from local industries during summer 2000. One computer science student was able to find an Internship with Robins Air Force Base in the area of computer networks and data communications. The other student majored in Electrical Engineering Technology was hired by the BellSouth in Macon to configure and install data communication systems. Both students attributed these job opportunities largely to the knowledge they gained in the data communications and computer networks class.

The equipment in computer network lab has also benefited other courses offered in the department. As a result of this project, students now have access to 32 more computers. These computers are equipped with various programming languages to increase student access to computers for doing homework assignments and projects in courses such as programming languages, C/Unix, and Contemporary languages. In addition Lab #319 which is now housed to the computer networking lab is also being used to teach various courses in both computer science and computer information systems. These courses such as computer hardware and software technology, operating systems, and computer architecture are best taught when students have computer access during the lecture.

It should be noted that prior to this project lab #319 was basically inactive because it had only 10 outdated computers that could not even fully support modern operating systems such as Windows 95 and 98. Today, this lab is the most active lab in our department and being utilized for teaching various Junior and Senior level courses in both Computer Science and Computer Information Systems.

Financial Report

The office of Business and Finance will provide the official financial report for this project. Ms. Dorothy Stripling who is in charge of the office of grants and contracts has compiled a comprehensive financial report for the project and will send it directly to the USAF office of scientific research.

This report also includes tables of items purchased for the project with their associated costs. The cost information in the tables is reported as accurately as possible. The items purchased directly from the project funds are shown in Table A.1 of the Appendix. Table A.2 shows the contributions of the Fort Valley State University to the project.

Faculty Development

Fort Valley State University provided financial support for the Principal Investigator, Dr. Masoud Naghedolfeizi, to attend a training course in the area of computer networks. The course was "Hands-on Internetworking with TCP/IP" and was offered by Learning Tree International in Washington D.C. Dr. Naghedolfeizi attended and completed the course during July 14- 19. The total cost including travel and registration was approximately $3,000. It should be noted that Fort Valley State University would continue to support faculty development in this area, as more funds become available.

Project Evaluation

During Spring semester 2000, we conducted an initial evaluation of the project by surveying students' opinion. Students who participated in the survey were mainly from Computer Science and Computer Information Systems majors with junior and senior classifications. These students used the lab facilities for their classes and/or accessing the Internet and World Wide Web prior to the survey. The survey questions and the student responses are shown in Appendix A. We are planning to carry out a second survey by December 15, 2000. The survey result will be posted on our Web Site at: www.mcs.fvsu.edu.

Plans for Future

The future plans call for expanding the lab to include fiber optics and ATM technologies. We are planning to request funds for these technologies through writing proposals and/or our departmental budget. We also plan to introduce a minor program in computer networks and data communications in near future. This minor program would require the development of two additional courses in this area. The department's faculty has had an initial discussion in this regard during the last departmental meeting in September 2000. The faculty will plan to elaborate on this issue in future meetings to evaluate if the department has sufficient financial and technological resources as well as faculty and staff supports to offer this minor program.

We are also committed to keeping the lab in very good operational conditions by constantly upgrading and/or maintaining the lab hardware and software systems. The cost of maintaining and upgrading will come from our yearly departmental budget and if needed Title III funds.

The photos of the computer network lab and its capabilities and features will be posted on our Web site at www.mcs.fvsu.edu by December 15, 2000. Currently, our web site is under major changes and access to it is very limited. The site should be ready by December 15, 2000.

Conclusions

The construction of computer networking laboratory initiated in August 1, 1999 and completed in September 15, 2000. The network laboratory has had a major impact on our

curriculum in the area of data communications and computer networks. Before this project, the department had virtually no technological infrastructure for its curriculum in this area. As a result of this project, in the Spring of 1999 for the first time the department was able to offer a course in data communications and networks with a laboratory support. In addition, the department was able to expand its curriculum in this area by developing an advanced course in data communications and computer networks.

It should be pointed out that as the technology advances in this area, there would be a need to upgrade and improve the technologies used in the lab as well. Therefore, we will continue our efforts to constantly upgrade and expand the lab technologies through writing proposals and seeking funds from various sources within the university.

Acknowledgement

APPENDIX

SUPPORTING DOCUMENT

Table A.1: Project Cost

| ITEM	Ordered	Received	Qty.	Cost	Total Cost	PO#
EQUIPMENT						
Cameras & Multimedia						
Digital Video Camcorder	03. Aug 00	11. Oct 00	1	$712,76	$712,76	216
Digital Video Cameras	22. Sep 99	20. Oct 99	10	$128,95	$1.289,50	
Firewire Card MAC	31. Jul 00	10. Aug 00	1	$169,00	$169,00	218
Firewire Card PC	31. Jul 00	22. Aug 00	1	$99,99	$99,99	218
Network Printers						
HP 4050 Laser Printer	04. Oct 99	20. Oct 99	1	$1.473,45	$1.473,45	901200
HP 8000 Laser Printer	04. Oct 99	20. Oct 99	1	$2.822,48	$2.822,48	901200
Computers						
Apple Macintosh						
Mac Server G3	22. Sep 99	01. Oct 99	2	$2.787,00	$5.574,00	900998
Mac Server G3	30. May 00	20. Jun 00	1	$4.001,18	$4.001,18	903027
PCs						
Dell Opti-Plex GX1p	22. Sep 99	20. Oct 99	1	$2.672,95	$2.672,95	900995
Dell Opti-Plex GX1p	22. Sep 99	20. Oct 99	1	$2.881,85	$2.881,85	901002
Dell Opti-Plex GX1p	22. Sep 99	20. Oct 99	2	$2.611,00	$5.222,00	900993
Dell Opti-Plex GX1p	22. Sep 99	20. Oct 99	1	$2.891,95	$2.891,95	900997
Dell Opti-Plex GX1p	04. Jan 00	25. Jan 00	2	$2.817,00	$5.634,00	901927
Dell Opti-Plex GX1p	04. Jan 00	25. Jan 00	1	$2.613,00	$2.613,00	901928
Dell Opti-Plex GX1p	22. Sep 99	20. Oct 99	2	$2.817,00	$5.634,00	901929
Dell Dimension XPS T650r	03. Apr 00	29. Apr 00	3	$1.296,00	$3.888,00	902733
Dell Dimension L55r	03. Apr 00	28. Apr 00	2	$1.187,00	$2.374,00	902734
Dell Inspiron 3800 Notebook	03. Apr 00	24. May 00	1	$2.434,00	$2.434,00	902732
Servers					$-	
Dell PowerEdge 2300	22. Sep 00	25. Oct 99	1	$8.016,00	$8.016,00	900990
Dell PowerEdge 4300	14. Mar 00	19. Apr 00	1	$7.712,00	$7.712,00	902577
Sun Systems						
Sun Microsystems Ultra 5 w/ Multimedia	22. Sep 99	01. Nov 99	2	4.503,40	$9.006,80	900989
Sun Microsystems Ultra 5	10. Dec 99	29. Apr 00	2	3.216,00	$6.432,00	901832
Sun Microsystem Ultra 10	10. Dec 99	29. Apr 00	1	3.223,00	$3.223,00	901832
Sun Microsystems Ultra 5	10. Apr 00	11. May 00	5	$1.295,00	$6.475,00	902784
Sun Microsystems Ultra 5	30. Jun 00	04. Aug 00	5	$1.295,00	$6.475,00	903090
Networking Equipment						
3COM NIC Network Interface Cards 10/100 Mbs)	14. Oct 99	10. Nov 99	5	$72,00	$360,00	901301
Routers and Supporting Devices						
Cisco Ethernet Router	22. Feb 00	01. Mar 00	1	$2.166,50	$2.166,50	902376
Cisco Ethernet Routers	07. Aug 00	31. Aug 00	2	$2.166,50	$4.333,00	257
Cisco Ethernet Router	09. Nov 99	05. Jan 00	1	$2.166,50	$2.166,50	901586
1-Port Serial WAN Interface Cards	02. Aug 99	31. Aug 99	4	$280,00	$1.120,00	183
1 Port ISDN wint NT-1 WAN Interface Card	02. Aug 99	26. Aug 99	1	$490,00	$490,00	901586
Appletalk/DECnet Feature Pack	22. Feb 00	01. Mar 00	1	$280,00	$280,00	902376

Appletalk/DECnet Feature Pack	17. Jul 00	31. Aug 00	2	$280,00	$560,00	81
Cisco 2600 Series IOS ip/IPX/AT/DEC	02. Aug 99	26. Aug 99	1	$280,00	$280,00	901586
3 Com Hubs					$-	4977,23
3Com SSII Dual Speed Hub 500 24 Managed 100/100 Ports	14. Oct 99	10. Nov 99	1	$834,00	$834,00	901301
SSII Unmanaged Hub Dual Speed 10/100 24 Auto	14. Oct 99	10. Nov 99	1	$679,00	$679,00	901301
SSII Unmanaged Hub Dual Speed 100/100 12 Auto	14. Oct 99	10. Nov 99	1	$443,00	$443,00	901301
3Com Dual Speed Hub 500 Management Module	14. Oct 99	10. Nov 99	1	$586,00	$586,00	901301
3Com Hub 8 Auto 10/100 with MDI Uplink	14. Oct 99	10. Nov 99	2	$209,99	$419,98	901301
3Com Hub 16 Auto 10/100 with MDI Uplink	14. Oct 99	10. Nov 99	1	$361,00	$361,00	901301
Netgear Hubs						
6-port dual speed hub w/uplink port	02. Nov 99	24. Nov 99	5	$119,99	$599,95	901517
8-port dual speed hub w/uplink port	02. Nov 99	24. Nov 99	2	$169,99	$339,98	901517
12-port dual speed hub w/uplink port	02. Nov 99	24. Nov 99	1	$239,99	$239,99	901517
Fast Ethernet Switches					$-	
3Com SS II Switch 3300 12 port	14. Oct 99	10. Nov 99	1	$1.113,00	$1.113,00	901301
3Com SS II Switch 3300 24 port	14. Oct 99	10. Nov 99	1	$1.671,00	$1.671,00	901301
Token Ring Switch						
3Com SSII Switch RT 2000 12 ports	22. Feb 00	20. Mar 00	1	$4.956,90	$4.956,90	902375
Extended Peripherial Devices						
HP External Tape Drive	13. Sep 99	29. Sep 99	1	$349,95	$349,95	900898
Wireless Networking Equipment						
Cisco Wireless Network Cards	31. Jul 00	22. Aug 00	10	$258,30	$2.583,00	258
Cisco Wireless Access Point	31. Jul 00	22. Aug 00	1	$909,30	$909,30	258
Mac Airport Cards	30. May 00	20. Jun 00	2	$112,04	$224,08	903027
Cables and Connectors						
Data Coupler/10 per pack	12. Oct 99	19. Oct 99	2	$89,99	$179,98	901260
RJ45 Connectors	31. Jul 00	06. Oct 00	1	$49,99	$49,99	217
CAB-V35FC V.35 CableDCE Female 10 ft	03. Aug 00	31. Aug 00	2	$70,00	$140,00	210
CAB-V35MT V.35 Cable DTE Male 10 ft	03. Aug 00	31. Aug 00	2	$70,00	$140,00	210
Category 5 Color Patch cables, 1,3,7,10,14,20,25 ft	10. Sep 99	30. Sep 99	1	$769,78	$769,78	979
Data Only Inline Coupler (Qty.25)	10. Sep 99	30. Sep 99	1	$99,99	$99,99	979
4,6,12-Port Surface Mount Box	10. Sep 99	30. Sep 99	1	$69,25	$69,25	979
SOFTWARE						
Cisco 2600 Software	22. Feb 00	15. Mar 00	1	$280,00	$280,00	2376
Cisco 2600 Software	17. Jul 00	31. Aug 00	2	$280,00	$560,00	81
Visio 2000	08. Aug 00	25. Sep 00	1	$359,95	$359,95	268
Observer 6	08. Aug 00	06. Oct 00	1	$995,00	$995,00	268
Total Cost					$131.437,98	

Table A.2: Institution Cost

ITEM	Ordered	Received	Qty.	Cost	Total Cost	PO#
Telecommunication						
ISDN Line Installation Charge	09-Feb-00	01-Mar-00	1		$227,25	n/a
Telephone Line	09-Feb-00	01-May-00	1		$65,00	n/a
Telpehone Set	17-Feb-00	14-Mar-00	1		$29,99	902247
Design of Wiring System in Room 319	06-Jan-00	27-Jan-00			$4.977,23	901803
Cables						
Black HD Suspension Belt - 1"x 7", 10 pk	14-Sep-99	07-Oct-99	1	39,99	$39,99	901107
Black HD Suspension Belt - 1"x 10", 10 pk	14-Sep-99	07-Oct-99	1	44,99	$44,99	901107
Black HD Suspension Belt - 2"x 16", 10 pk	14-Sep-99	07-Oct-99	1	65,99	$65,99	901107
Cable Catch White	14-Sep-99	07-Oct-99	1	135,99	$135,99	901107
Cable Wrap-Lite Blue	14-Sep-99	07-Oct-99	1	99,99	$99,99	901107
Faculty Development						
Training Course in Hands-on internetworking with TCP/IP	14-July-2000		1	2,910.32	$2,910.32	
Total Cost					$8592.24	

SURVEY

Computer Networking Laboratory CTM 319
May 8-11, 2000
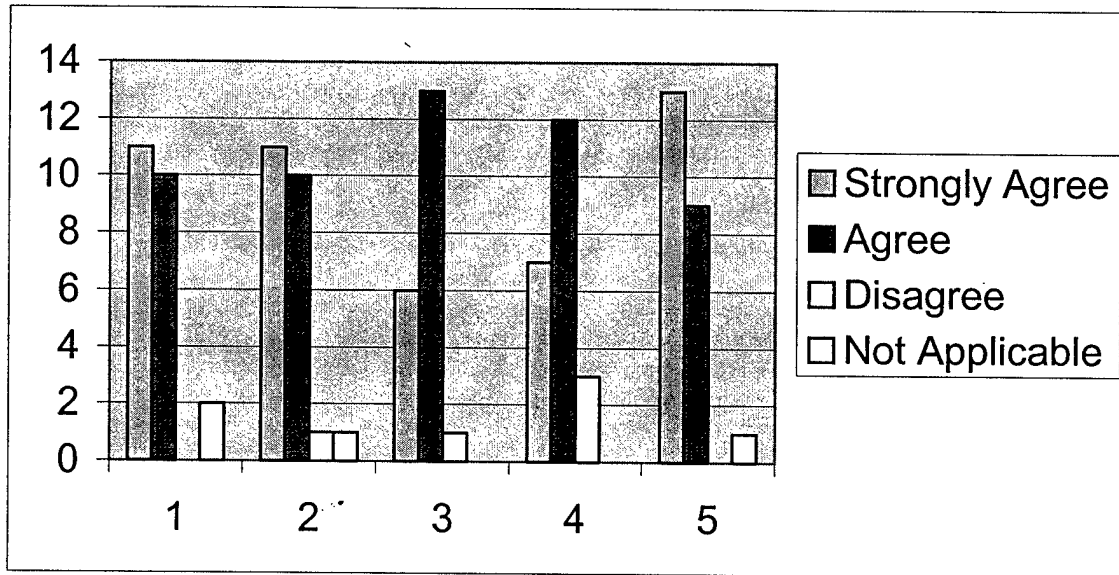
1. The computing facilities in room 319 (Computer Networking Laboratory) have been very helpful in learning computer networking concepts.

2. The computing facilities in room 319 (Computer Networking Laboratory) have been very helpful in doing my works for non-computer networking courses.

3. The computing facilities in Room 319 (Computer Networking Laboratory) have been very helpful for doing research on World Wide Web or accessing Internet utilities such as FTP and Net meeting.

4. The technologies used in room 319 have encouraged me to work with computers more often than before and learn more about computer systems

5. As the result of computing facilities in room 319, the Computer Science/Mathematics Department has considerably improved its technological infrastructure for its curricula.

	Strongly Agree	Agree	Disagree	Not Applicable
1	11	10	0	2
2	11	10	1	1
3	6	13	1	0
4	7	12	3	0
5	13	9	0	1

Description of the Course Developed in Advanced Data Communications and Networks in the 2001 –2003 University Catalog

CSCI 4000 Senior Seminar   3 Credits (3-0)
Prerequisite: Completion of All Major Courses Through the Junior Level
Students demonstrate their mastery of core materials covered in previous courses and their ability to apply the same. Senior integrated assessment is embedded in this course.

CSCI 4109 Internship   3-9 Credits (3-0, 9-0)
Prerequisite: Consent of Department Head
Students gain practical experiences in the computing profession. Each student is assigned to work in an approved training center that needs assistance in developing or modifying a computer application. Students work under the supervision of the instructor of the course and a professional at the approved center.

CSCI 4150 Advanced Communications and Networks   3 Credits (2-2)
Prerequisites: CSCI 3150
Students acquire an in dept working knowledge of advanced topics in communications technologies and computer networks. The course topics include protocol design, client-server architecture, enterprise LAN/WAN, socket interface, Internet working and TCP/IP, Internet and intranet firewalls. In addition, network switches and emerging technologies in computer networking and communication system will be studied.

CSCI 4210 Computer Architecture   3 Credits (3-0)
Prerequisites: CSCI 2201, CSCI 3351
Students acquire an understanding of the internal logical structures of computers and the techniques of machine level programs, architectures, and functioning of micro/conventional computer systems.

CSCI 4320 Software Engineering   3 Credits (3-0)
Prerequisite: CSCI 3339
Students become familiar with the principles, methods and current practices useful and/or essential for developing large scale software, including well-understood requirements, logical design, and object-oriented methods.

CSCI 4340 Principles of Operating Systems   3 Credits (3-0)
Prerequisites: CSCI 3410, CSCI 3351, or CSCI 3100
Students gain knowledge of basic principles, structure, and functions of modern operating systems. In addition, they gain experience with concurrence, multi-tasking, resource management and allocation, and process synchronization.

CSCI 4350 Compilers   3 Credits (3-0)
Prerequisites: CSCI 3410, CSCI 4500
Students acquire a basic understanding of compilers design, construction and

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Proposal for Developing an Advanced Course in Data Communications and Networks

FORT VALLEY STATE UNIVERSITY

FORT VALLEY, GEORGIA

A 5-15-00

COURSE PROPOSAL FORM
FOR THE MAJOR COURSE OFFERINGS

<u>Computer Science and Mathematics</u>

| Department Initiating Request | Date of Submission | Signature of Faculty Member Initiating Request |

This course is proposed for _____

Course Prefix __CSCI__   Course Number: _4150_ Course Title: __Advanced Data Comm. & Networks__

Short title for computer listing _A_ _D_ _V_ _C_ _O_ _M_ _M_ _N_ _E_ _T_
(no more than 10 characters and spaces)

Course to be offered (first time)   __Fall__   _2000_   _3_   _4_   _2_   _2_

| Semester | Year | Credit Hours | Contact Hours | Lecture | Lab Hours |

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I. Prerequisite(s)___ CSCI 3150 _____ (if applicable)

Provide course description as it will appear in the catalog.

Students acquire an in-dept working knowledge of advanced topics in communications technologies
and computer networks. This will include protocol design, client-server architecture, enterprise
LAN/WAN, socket interface; internetworking with TCP/IP, Internet and Intranet firewalls. In addition,
network management protocols and architectures, packet-switched and fault-tolerance networks, ATM
switches and emerging technologies in computer networking and communication system will be studied.

II. List the specific objectives of the proposed course.

1.	Students will be able to configure and interconnect LANs of different topologies and architectures using TCP/IP protocol and its addressing system.
2.	Students will de able to differentiate between pocket switching routing and transmission routed protocols.
3.	Students will be able to use network devices to perform network segmentation and configurations.
4.	Students will understand the importance of data security and data compression in the operation of computer networks.
5.	Students will learn various methods for network tuning and performance optimization.
6.	Students will learn to write programs for client- server interaction.